The Effects of Energy Intake and Oxygen Consumption on Resting Metabolic Rate Among Endurance Athletes: A Pilot Study

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ABSTRACT

College students are not known for their nutritional education, and student athletes are no exception. Endurance sports performance relies on many factors, such as training schedule, coaching methods, and training location, but less focus is put on nutritional intake.
PURPOSE: to address the question of whether an athlete's overall energy intake versus resting metabolic rate (RMR) correlate with an endurance runner's performance capacity.
METHODS: ·College student-athletes (n=10, n=6 female) completed a 7-day dietary log to determine an average energy intake (SuperTracker), obtained RMR values (Parvo Medics' TrueOne® 2400), and completed a timed race to assess the associations between caloric intake and the amount of oxygen consumed during a minute of running. **RESULTS**: There is a positive linear correlation between RMR and average energy intake and significant relationship between RMR, VDOT, and Average Energy Intake (p=0.001). **CONCLUSIONS**: For student athletes of the same VDOT and Average Energy Intake of the same age, on average males consume an RMR of 25.16 kcal/day more than females.

INTRODUCTION

- VDOT is the measure of volume of oxygen consumed per minute. A runners' running economy and velocity at Vo_2 Max (vVO_2Max) designed to give an individual a score which they can then use to determine training methods.[2]
- Resting metabolic rate (RMR) is an accurate prediction of 60-75% of total energy expenditure that can be used in a calculation to prescribe energy needs.[1]
- This UROP is designed to address the question of whether an athlete's overall energy intake versus RMR correlate with an endurance runner's performance capacity.

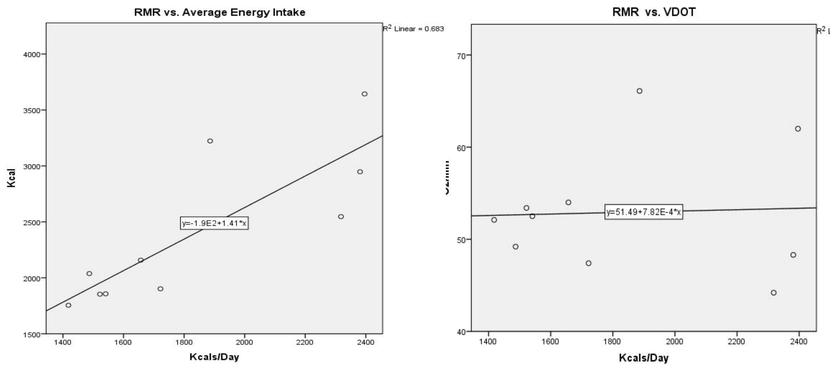
METHODS

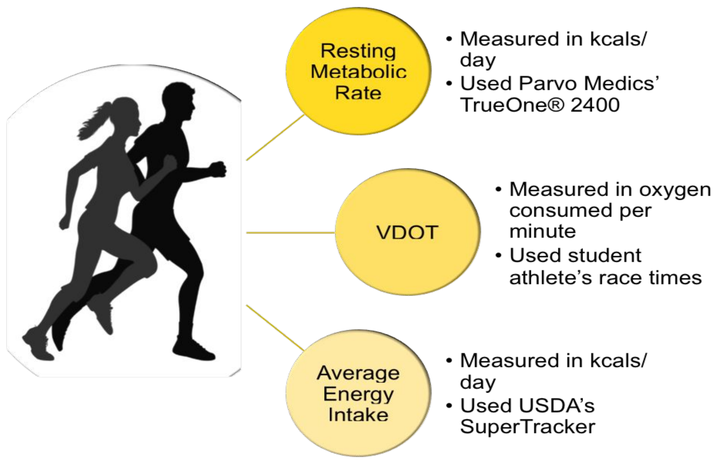
- ·College student-athletes (n=10, n=6 female) completed a 7-day dietary log to determine an average energy intake (SuperTracker), obtained RMR values (Parvo Medics' TrueOne® 2400), and completed a timed race to assess the associations between caloric intake and the amount of oxygen consumed during a minute of running.
- When assessing RMR, student athletes fasted for 12 hours. RMR was measured using a 10-minute collection interval, and was determined from the most stable heart rate.

Table 1. Descriptive statistics of student athlete participants

Sex	Age (years)	RMR (kcals/day)	Average Energy Intake (kcals)	VDOT (O_2/min)
Male	23.3 ± 4.6	2245 ± 242	3090 ± 461	55.2 ± 10.6
Female	19.3 ± 1.5	1558 ± 112	1927 ± 146	51.4 ± 2.6

Figure 1. Correlation Graphs between RMR (kcal/day) and a.) average energy intake (kcals) (r=0.826) and b.) VDOT (O_2/min) (r=0.046)





RESULTS

· Normality was assessed via Shapiro Wilkes, we can assume normality of data based on guidelines[3].
· Average participant age, SD, descriptive statistics are presented in table 1. All data is presented as group means ± standard deviation in Table 1.
· There is a positive linear correlation between RMR and Average Energy Intake (r=0.826) as shown in Figure 1. RMR and VDOT did not show significant correlation (r=0.046).
· The multiple regression equation is [ŷ=1659.22 -30.55(VDOT)+0.6189(avg.cal)+14.33(age)+25.16(sex)]. Based on adjusted R^2, 92% of the variance in RMR is explained by VDOT, Average Energy Intake, and Sex in the model.
· To test whether all the variables taken together significantly predict the outcome of RMR and F-Test resulted in F-Statistic=28.16 on 4 and 5 degrees of freedom and p=0.0012.

CONCLUSIONS

- This pilot study demonstrates a significant association between RMR, average energy intake and the amount of oxygen consumed during a minute of running.
- For student athletes of the same VDOT and average energy intake of the same age, on average males measure a RMR of 25.16 kcal/day more than females.

REFERENCES

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3. Mordkof, J.T. (2016). The Assumptions of Normality.